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REVISION OF THE NEARCTIC MOTH GENUS ABAGROTIS SMITH WITH DESCRIPTIONS OF NEW SPECIES (LEPIDOPTERA: NOCTUIDAE) Part 2

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REVISION OF THE NEARCTIC MOTH GENUS ABAGROTIS SMITH WITH DESCRIPTIONS OF NEW SPECIES
(Lepidoptera: Noctuidae)

PART II: THE ERRATICA GROUP, WITH THE DESCRIPTION OF A NEW SPECIES FROM CALIFORNIA; THE VITTIFRONS GROUP

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A. erratica Group

Diagnosis - Antennae of male strongly serrate, fasciculate, apically ciliate, of female setose. Palpi exterolaterally blackish. Thorax with undivided collar. Primaries light tan, pinkish, luteous gray, or brown; subtrigonate; tarsi with ungues bifurcate. Male genitalia with sacculus extremely broad (as in figs. 41, 42, 43); valves with blunt to "hammer-shaped" terminal part; aedeagus with vesical sac possessing a single, large to extremely large (see fig. 77) prominent cornutus plus an additional sclerotized plate. Female genitalia with ductus bursae and accessory lobe heavily sclerotized, with many wrinkles; bursa copulatrix possessing two signa (as in figs. 116, 117, 120). Greatest expanse of forewing varies from 15 mm to 18 mm.

Included species - *A. erratica erratica* (J. Smith); *erratica ornata* J. Smith; *kirkwoodi* Buckett n. sp.; and *alcandola* (J. Smith).

Distribution - Both mountainous and valley areas of the Pacific Coast states; Great Basin regions of Idaho; and the chapparal areas of Arizona.

Key to species of the *A. erratica* group based on maculation and distribution:

1. Reniform mark large, dark, rectangular in shape (as in figs. 154, 155, 156); ground color of primaries brownish, appearing irrorated with darker brown flecks; subterminal line ochreous, preceded by a dark brown shade; Arizona. . . . . .*alcandola* (J. Smith)

   Reniform mark thinner than in preceding, not as large (as in figs. 147 through 153); ground color of primaries light tan, luteous gray, to light brown; subterminal line usually weak, prominent shade preceding it lacking; not known to occur in Arizona. 2

2. Ground color of primaries luteous gray in males, light tan irrorated with brick red in females; normal cross lines hardly discernible; transverse posterior line represented by a single row of black dots; coastal southern California (see distribution map, fig. 1). . . . . .*kirkwoodi* Buckett

   Ground color of primaries light tan, may be irrorated with brick red, or if luteous gray, maculation discernible; transverse posterior line often geminate, black; central California northward into Canada and eastward into Utah. 3

3. Ground color of primaries light tan, may be irrorated with brick red, or if approaching luteous gray, maculation not outstanding; in central California northward into eastern Oregon and eastward into Utah . . . . . .*erratica erratica* (J. Smith)

   Ground color of primaries luteous gray, maculation contrasting (as in figs. 150, 151); transverse posterior line often geminate, represented by black dots on veins; coastal Oregon northward into British Columbia, eastward into northern Idaho and into Manitoba. . . . . .*erratica ornata* J. Smith

Key to species of the *erratica* group based on genitalia:

1. Aedeagus of male possessing an evertible sclerotized base of vesical sac; vesical cornutus with small apical projection (as in fig. 75); lacking any additional armor on vesical sac; accessory sac of female genitalia very large, heavily sclerotized; ovipositor lobes not truncate. . . . . .*erratica (sensu lato)*

   Aedeagus of male lacking evertible sclerotized base of vesical sac; vesical cornutus with large apical projection (as in figs. 76, 77); possessing an additional spined sclerotized band on vesical sac; female genitalia with accessory sac less sclerotized than in preceding (as in figs. 117, 120); ovipositor lobes truncate. 2

2. Valves ending simply, or slightly modified; outline of vesical cornutus tapering gradually from base to apex (as in fig. 76). . . . . .*kirkwoodi* Buckett

   Terminal part of valves modified into large apical structure (as in fig. 42); outline of vesical cornutus nearly parallel for 2/3 its length, then abruptly tapered, truncate, bearing a large claw-like spine (as in fig. 77). . . . . .*alcandola* (J. Smith)

Abagrotis erratica erratica (J. Smith)
(figs. 1, 26, 27, 28, 41, 75, 116, and 147-149)

Agrotis erratica J. Smith, 1890, Trans. Amer. Entomol. Soc. 17:41, Lectotype male, Sierra Nevada, California, male genitalia on E. L. Todd slide No. 1800, type No. 75 (USNM), by present designation; Grote, 1895, Abhandlungen Naturwissenschaftlichen Verein, Bremen, 14:59.

Triphaena erratica, Hampson, 1903, Cat. of the Noctuidea in the Collection of the British Mus. 4:623, fig. 113.

Lampra erratica, Benjamin, 1921, Bull. So. California Acad. Sci. 20(3); 76, 77-78, pl. 1, fig. 1, pl. 5, fig. 32.

Abagrotis erratica, J. Smith, 1890, Bull. U.S. Nat. Mus., No. 38, p. 50; 1893, Bull. U.S. Nat. Mus., 44, p. 60; Dyar 1903 (1902), Bull. U.S. Nat. Mus., No. 52, p. 131; Holland, 1903, the Moth Book, p. 180; Barnes and McDunnough, 1917, Check list Lepidoptera Boreal Amer. p. 48; Draudt, in Seitz, 1923, the Macrolepidoptera of the World 7:80, pl. 12(f), fig. 4; McDunnough, 1928, Bull. Canadian Nat. Mus., No. 55, Biol. ser. No. 16:70; 1938, Mem. So. California Acad. Sci. 1:67; Llewellyn-Jones, 1951, Entomol. Soc. British Columbia, Occasional Paper No. 1, p. 53; Crumb, 1956, U.S.D.A. Tech. Bull. 1135, p. 117, pl. 5, fig. f.

Diagnosis - Male: Ground color tan, irrorated with brick red scales, pinkish in aspect. Head of ground color; exterolateral part of palps black scaled; third segment of palps 1/5 the size of second segment; black patches of scales may or may not be present around compound eyes between antennal sockets and base of palps; antennae heavily bipectinate, terminally ciliate. Thorax dorsally as ground color, collar weakly defined; tegulae and disc clothed in both simple and flattened hairs; ventrally with black streak of hairs from eyes to beneath primaries; remainder clothed in whitish pubescence; tibial segments of legs with rose and ochreous hairs; mid and hind tibiae spined; primaries dorsally of ground color; basal and transverse anterior lines hardly discernible; transverse posterior line commencing on costa as a dark wedge, thence represented by black dots on veins; orbicular spot not erect, oblong, centrally filled with darker brown than ground color; reniform mark rectangular, slightly constricted medially, darker than ground color, inner marginal part darkest, darker than orbicular spot; subterminal line darker than ground color, wavy, more or less following course of outer margin; terminal line represented by lunules between veins; fringes darker than ground color; ventral surface with medial area of dark brown; reniform mark and transverse posterior line dark brown; terminal line represented by dark lunules between veins; inner margin irrorated with white scales

so as to appear whitish; secondaries basally light brown, becoming darker terminally; discal spot present, dark brown; fringes of ground color; ventral surface ground color; discal dot dark brown. Abdomen dorsally as ground color, terminally clothed in rose colored hairs; ventrally of ground color. Greatest expanse of forewing 16 mm to 18 mm. Genitalia as in figs. 41, 75.

Female - As male except ground color more pinkish; in lighter washed-out specimens, collar may be defined by white-tipped flattened and simple hairs. Greatest expanse of forewing 16 mm to 18 mm. Genitalia as in fig. 116.

Material studied - 199 males, 70 females, July through October. UNITED STATES. *California counties:* Alameda, Contra Costa, Fresno, Inyo, Kings, Lake, Modoc, Mono, Nevada, Plumas, Shasta, Siskiyou, Sonoma, Stanislaus, Tuolumne, Yolo. *Idaho:* Blaine, Elmore. *Oregon:* Grant. *Utah:* Logan, Utah, Weber.

Recognition characters - *A. erratica erratica* can be distinguished from *erratica ornata* by the very low percentage of contrastingly maculated forms, as well as by its more southerly distribution. Nominate *erratica* might be confused with *kirkwoodi* but can be distinguished from the latter by the possession of a rather small cornutus of the vesica (see fig. 75) plus an additional sclerotized evertible base of the vesical sac. By maculation, it is difficult to distinguish nominate *erratica* from *kirkwoodi*. Thus far, *erratica* has not been recorded from southern California, the habitat of *kirkwoodi*. Nominate *erratica* can be distinguished from *alcandola* by the lack of the large reniform mark in the former, the lack of the dark shade preceding the subterminal line and the lighter ground color.

Holland (1903) showed a line cut of *erratica,* but the primaries were too pointed. Seitz (1923), pictured *erratica* in color, but the color is too dark to be typical. Hampson (1903) depicted this species accurately. The photograph in Benjamin's revision (1921) is too dark and not well defined (pl. 5, fig. 32).

Distribution - *A. erratica erratica* occurs throughout central California and extends northward into eastern Oregon and into Utah. It was first described from specimens collected in the Sierra Nevada, probably from Truckee, Nevada County, California. There is intergradation between nominate *erratica* and subspecies *ornata,* and different phenotypes are found in the areas of interdigitation; the Great Basin populations are con-subspecific with the nominate form, therefore not exhibiting the dark form of *ornata*. No doubt, *erratica erratica* occurs in Nevada, but no specimens are available for study.

Abagrotis erratica ornata J. Smith
(figs. 1, 150-151)

Abagrotis ornatus J. Smith, 1903, J. New York Entomol. Soc. 11:4, lectotype female, Kaslo, Brit. Columbia (J. W. Cockle) (AMNH), by present designation. Barnes and McDunnough, 1917, Check list Lepidoptera Boreal Amer., p. 48; Draudt, in Seitz, 1923, the Macrolepidoptera of the World, 7:80; Rindge, 1955, Bull. Amer. Mus. Natur. Hist. 106(2):125.

Lampra erratica ornatus, Benjamin, 1921, Bull. So. California Acad. Sci. 20(3):76, 78-79, pl. 5, fig. 33.

Abagrotis erratica ornatus, McDunnough, 1938, Mem. So. California Acad. Sci. 20(3):67.

Diagnosis - Male: Ground color luteous gray to fuscous brown. Head with antennae lengthily pectinate, terminally setose; vertex and frons clothed in a tricolor pubescence, basally luteous, thence dark brown, apically white-tipped; second palpal segment exterolaterally clothed in black simple and flattened hairs, apically lighter; third palpal segment light tan, very short in comparison with preceding segment; patch of black hairs present bordering compound eyes one-half the way between antennal sockets and palpal bases. Thorax as in ground color; collar brown, white-tipped apically; anterior dorsal tuft porrect, or not, colored as is collar; disc and tegulae concolorous; ventrally clothed in sooty to fuscous simple hairs; legs with all segments concolorous; primaries with geminate basal half line when present, both lines dark brown; transverse anterior line geminate, dark brown, with three large outward scallops, in some specimens hardly discernible; orbicular spot oblong, dark brown, outlined in ground color, thence surrounded by a neatly defined dark brown annulus; reniform mark oblong, with color as in orbicular spot, slightly constricted medially; both orbicular spot and reniform mark markedly contrasting with remainder of wing; transverse posterior line faintly geminate, outer line represented by a series of dark dots on veins; subterminal line irregular in course, faint; terminal line represented by lunules on veins; fringes darker then ground color; ventral surface glossy, ground color as in dorsal surface; reniform mark and transverse posterior line present in dark brown; terminal line faint; secondaries dorsally a deep fuscous, lightest basally; discal dot faint; fringes white; ventral surface fuscous, discal dot and exterior line present in brown; fringes white. Abdomen dorsally unicolorous, as in ground color; ventrally lighter. Greatest expanse of forewing 15 mm to 18 mm. Genitalia as in figs. 41, 75.

Female - Greatest expanse of forewing 16 mm to 18 mm. Genitalia as in figure 116.

Material studied - 86 males, 73 females, July through September. CANADA. *British Columbia:* Creston; Duncans, Vancouver Island; Kaslo; Keremeos; Lillooet; Robson; Summerland; Vernon. *Manitoba:* Brandon. UNITED STATES. *Idaho:* Shoshone. *Oregon:* Marion; Washington. *Washington:* Pierce; Stevens; Walla Walla; Yakima.

Recognition characters - *A. erratica ornata* can be confused with the nominate subspecies from which it can be separated by: 1) ashen gray to luteous gray coloration; 2) distinct maculation; and 3) its more northern distribution (see distribution map, fig. 1). This subspecies is retained only because of the high percentage of specimens exhibiting ashen gray coloration plus prominent maculation. Only minor differences occur in the genitalia. The form *ornata* is occasionally found within the range of the nominate subspecies.

Crumb (1956) published a larval description of *erratica;* his specimens from Washington probably represent *ornata.* Crumb (op. cit.) gave the general coloration of the larvae as ". . .brownish to purplish brown." He listed the larval foodplant as willow (*Salix* sp.).

Distribution - *A. erratica ornata* has a more northern distribution than the nominate *erratica,* being the dominant form in British Columbia, Canada where it is extremely dark (see figs. 150-151). It is also recorded from coastal Oregon; from northern Idaho; and from Manitoba, Canada.

Abagrotis kirkwoodi Buckett, n. sp.
(figs. 1, 43, 76, 117, 152, 153)

Holotype male - Ground color luteous gray; head clothed in brown-tipped light colored hairs; frons smooth; palpi black exterolaterally, third segment very short, stubby; antennae bipectinate, ciliate terminally; patch of black hairs bordering compound eyes one half the distance between antennal sockets and bases of palps. Thorax with collar defined by a brown line, collar scales white-tipped; dorsally with central longitudinal ridge of hairs; spreading divided crests of irrorated white-tipped brown simple hairs; ventrally with black streak of hairs from compound eyes to beneath primaries; remainder of pubescence pale luteous gray, rose tinged; femoral segments of legs clothed in whitish hairs, brownish towards apex, thence whitish terminally; tibial segments clothed in brick red hairs; mid and hind tibiae spined; mid tibiae with unicolorous end spurs; hind tibiae with unicolorous medial and end spurs; tarsi unicolorous, luteous gray; primaries pale luteous gray, basal line wanting for most part, represented costally by dark brown wedge; transverse anterior line hardly discernible, faint dark brown traces on costal half of wing; orbicular spot outlined in brown, an inner ring of ground color,

thence filled with brown; reniform mark erect, rectangular, slightly constricted medially, darker than orbicular spot; transverse posterior line outwardly oblique, represented by brown wedge on costa, thence by a series of brown dots on veins; subterminal line weakly represented in brown, becoming stronger between veins for costal half of wing; terminal line represented by brown dots between veins; ventral surface dull brown, reniform mark present in dark brown; transverse posterior line present in dark brown; secondaries dorsally fuscous, lighter in basal area; discal dot present in dark brown; veins outlined in dark brown; brown terminal line present; fringes tinted with rose; ventral surface light brown, costally defined in rose-colored scales; discal dot dark brown; exterior line dark brown, hardly discernible; fringes with rose color less pronounced than on dorsal surface. Abdomen dorsally of ground color, terminal part with brick red simple hairs; pleural area with pinkish band; venter as in ground color. Greatest expanse of forewing 17 mm. Genitalia as in figs. 43, 76.

Female - Ground color with more red than in male, therefore appearing pinkish; antennae long, setose; orbicular spot and reniform mark less prominent than in male; subterminal line very prominent, inwardly dark brown, outwardly pale luteous gray; fringes dark smokey brown, darker than in male; secondaries deep smoky fuscous; fringes luteous, pink tinged. Greatest expanse of forewing 18 mm. Genitalia as in figure 117.

Types - Holotype male, 2 miles southeast Modjeska, Santa Ana Mountains, Orange County, California, 23 September 1962 (the Flemmings), deposited in the Entomology Type Collection, University of California, Davis. Paratypes: 1 female (designated Allotype), same data as in holotype (Bauer-Buckett slide No. 63B4-1); 1 male, same data as holotype (Bauer-Buckett slide No. 63B4-47); 1 male, same data as holotype; 1 male, Encinitas, San Diego County, California, 11 September 1961 (Bauer-Buckett slide No. 63B19-2); 1 male, Los Angeles, Los Angeles County, California, 1-20 October 1929 (Bauer-Buckett slide No. 63B1-4); 1 male, Ventura, Ventura County, California, 3 October 1951 (C. W. Kirkwood), (Bauer-Buckett slide No. 62D4-2). Paratypes deposited in the following institution and collection: B-B; LACM.

Variation - In the specimens available *A. kirkwoodi* exhibits variation only between sexes. The males are rather uniform luteous gray whereas the females are pinkish.

Recognition characters - This species resembles *erratica erratica* very closely. The best character to separate it is the aedeagus of the male; the vesical sac of the aedeagus possesses a greatly enlarged cornutus (see fig. 76), and lacks the basal sclerotized everitible plate present in *erratica*. In the female genitalia, the ovipositor lobes of *kirkwoodi* are more trigonate, whereas in *erratica* they are more pointed (see figs. 116 and 117); also, *kirkwoodi* has a less sclerotized bursa copulatrix.

Distribution - To date *kirkwoodi* has been collected only in the greater Los Angeles area, and southward into San Diego County (see distribution map, fig. 1).

Abagrotis alcandola (J. Smith)
(figs. 1, 42, 77, 120, 154-156)

Rhynchagrotis alcandola J. Smith, 1908 (?), Canad. Entomol. 40(8):288. Holotype female, Minnehaha, Yavapai County, Arizona, 4 October (AMNH).

Abagrotis alcandola, Barnes and McDunnough, 1917, Check list Lepidoptera Boreal Amer. p. 48.

Lampra alcandola, Benjamin, 1921, Bull. So. California Acad. Sci. 20(3): 76, 79, pl. 1, fig. 2, pl. 5, fig. 34.

Abagrotis alcandola, Draudt, 1923, in Seitz, the Macrolepidoptera of the World 7:80; McDunnough, 1938, Mem. So. California Acad. Sci. 1:67; Rindge, 1955, Bull. Amer. Mus. Natur. Hist. 106(2):100; Crumb, 1956, U.S.D.A. Tech. Bull. 1135, pp. 114, 115.

Abagrotis tristis Barnes and McDunnough, 1912, Contrib. Lepidoptera North Amer. 1(5):8, pl. 1, fig. 17, lectotype male, Santa Catalina Mts., Arizona, September, male genitalia on slide 1795 E. L. Todd (USNM), by present designation.

Diagnosis - *Male:* Ground color of primaries varies from light reddish brown to pale luteous gray. Head with exterolateral part of palps clothed in either brown or black scales, generally quite contrasting with ground color; antennae strongly pectinate, becoming ciliate terminally, more abruptly so than in *erratica;* vertex clothed in light hairs, or whitish-tipped hairs. Thorax with collar well defined in white-tipped simple flattened hairs; dorsum with anterior tuft porrect, well defined, of white-tipped flattened hairs (not so obvious on worn or battered specimens); ventrally clothed in light colored hairs which may be tinted with rose or brown; legs clothed in brown pubescence, generally darker than ground color, pubescence may be pink tinted; primaries as in ground color; basal line represented on costa by dark wedge, thence wanting; transverse anterior line geminate, jagged from costa to inner margin with three outward scallops; orbicular spot large, filled with dark brown, or at least a darker shade than ground color; transverse posterior line lighter inwardly than ground color, outwardly darker than ground color, represented by a series of black dots on veins, but seldom on radial veins; subterminal line light, defining darker subterminal area from terminal area; terminal line represented by black lunules on veins; fringes dark brown; ventral surface medially dark brown; orbicular spot hardly discernible; reniform mark present, dark brown; transverse posterior line a broad brown band; terminal lunules dark brown; inner marginal area irrorated with light colored scales; re-

mainder of wing of ground color, sometimes tinted with pink; secondaries fuscous, lightest in basal area; discal lunule present; fringes lighter than bulk of wing; sometimes tinted with pink; ventral surface lighter than ventral surface of primaries; discal dot present; costal margin darker than remainder of wing, may be irrorated with pink. Abdomen dark brown, unicolorous dorsally and ventrally. Greatest expanse of forewing 16 mm to 17 mm. Genitalia as in figures 42, 77.

Female - Dorsal surface of secondaries deeper fuscous than in male, unicolorous, discal dot hardly discernible; ventral surface with prominent discal dot and exterior line on secondaries. Greatest expanse of forewing 15 mm to 17 mm. Genitalia as in figure 120.

Material studied - 19 males, 9 females, August through September. UNITED STATES. *Arizona:* Coconino; Gila; Maricopa; Pima; "south Arizona."

Recognition characters - *A. alcandola* can be confused with other members of the *erratica* group. It may be distinguished by its somewhat larger size; larger, darker, prominent orbicular spot and reniform mark (the latter being very upright and only slightly constricted medially); and the greatly enlarged vesical cornutus of the aedeagus in the male (as in fig. 77). Also its limited allopatric distribution will help serve as a superficial criterion for distinguishing it from the other members of the group.

Distribution - Thus far, *alcandola* is known only from Arizona, primarily from the lower elevations where its larval foodplant occurs. Crumb (1956) cited Ash (*Fraxinus* sp.) as the larval foodplant of *alcandola,* and he stated that the general color of the larva is "dark gray."

A. vittifrons Group

Diagnosis - Antennae of male biserrate, fasciculate, or ciliate basally, apically ciliate-setose; of female weakly setose or ciliate; palpi with second segment exterolaterally black; thorax with divided collar; primaries dark brown, costally with prominent light colored band (as in figs. 157 through 161); tarsi with ungues weakly bifurcate; male genitalia with sacculus somewhat thickened (as in figs. 44, 45, 46); aedeagus with vesical sac armed with a single cornutus plus a sclerotized plate (as in figs. 78, 79, 80); greatest expanse of forewing varies from 14 mm. to 19 mm.

Included species - *A. vittifrons* (Grote), *bimarginalis* (Grote), *totonaca* (Schaus).

Distribution - Found in Great Basin areas, the mountainous regions of southern and eastern California, in Arizona, and in Nearctic Mexico.

Key to species of the *A. vittifrons* group by superficial characters

1. Antennae of male biserrate, fasciculate, of female weakly setose; primaries with light tan to orangish colored costal band, terminal area bluish to silvery gray; secondaries dorsally fuscous. 2
   Antennae of male ciliate basally; apically ciliate-setose; of female ciliate; primaries with cream-colored costal band, terminal area brown; secondaries whitish, veins lightly outlined in fuscous. . . . . .*vittifrons* (Grote)
2. Costal band of primaries light tan, possessing two dark brown transverse dashes towards base; occurring in central eastern Mexico . . . . . .*totonaca* (Schaus)
   Costal band of primaries light tan to orange, lacking any transverse dashes; occurring in the southwestern United States. . . . . .*bimarginalis* (Grote)

Abagrotis vittifrons (Grote)
(figs. 2, 44, 78, 119, 157, 158)

Noctua vittifrons Grote, 1864, Proc. Entomol. Soc. Philadelphia, 3:527, plate 5, figure 6. Lectotype male (nec. female as Grote stated), Colorado Terr. (J. Ridings), (ANSP), by present designation.

Agrotis vittifrons, Grote, 1868, Trans. Amer. Entomol. Soc. 2:309.

Rhynchagrotis vittifrons, J. Smith, 1890, Bull. U. S. Nat. Mus. No. 38:16, 17, 26-27; 1893, Bull. U. S. Nat. Mus., No. 44:54; Dyar, 1903 (1902), Bull. U. S. Nat. Mus., No. 52:129; J. Smith, 1908, Canad. Ent. 40(7):224; Barnes and McDunnough, 1917, Check list Lepidoptera Boreal Amer., p. 48.

Triphaena vittifrons, Hampson, 1903, Cat. Lepidoptera Phalaenidae Brit. Mus. 4:624, 633, pl. 77, fig. 4.

Lampra vittifrons, Benjamin, 1921, Bull. So. California Acad. Sci. 20(3): 83, 85-86, pl. 1, fig. 4, pl. 5, fig. 36; Draudt, in Seitz, 1923, the Macrolepidoptera of the World 7:81, pl. 12(f), fig. 6.

Abagrotis vittifrons, McDunnough, 1938, Mem. So. California Acad. Sci. 1:67; Llewellyn-Jones, 1951, Entomol. Soc. Brit. Columbia, Occasional Paper No. 1:53.

Diagnosis - Male: Ground color dark brown with conspicuous costal cream-colored band. Head with frons clothed in admixture of black and white scales; palpi clothed in simple and flattened hairs, second segment exterolaterally black, terminally with a cream-colored annulus, third segment colored as in apical portion of preceding segment, with moderately long black hairs; antennae with flagellum finely ciliate, dorsally clothed in black scales. Thorax with multicolorous collar, basally black, thence white, black, white, terminally orange-brown; dorsally with divided anterior tufts of black shiny scales; disc dark brown, posteriorly white

hairs present; ventrally clothed in admixture of black and white hairs; legs charcoal in coloration; fore tibiae exterolaterally clothed in straw-colored hairs; midtibiae colored as in foretibiae; hind tibiae posterolaterally with straw-colored elongate simple hairs, interolaterally of white scales; primaries with ground color brownish-black; wide cream-colored costal band from base of wing to transverse posterior line; basal line absent; transverse anterior line geminate, black, centrally filled with dark luteous gray; orbicular spot and reniform mark represented by dot of cream-colored scales; transverse posterior line geminate, centrally filled with dark luteous gray, or brown, outcurved around reniform mark, thence toward wing base, thence on to inner margin; subterminal line serrate, cream-colored; terminal line cream-colored; fringes dark brown; ventral surface fuscous to dark brown, costally possessing a straw colored band, not being as pronounced as on dorsal surface; transverse posterior line dark brown; subterminal line dark brown; terminal area irrorated with white; terminal line dark brown; secondaries dorsobasally whitish; fringes white; remainder of surface irrorated with fuscous; ventral surface with costal band of straw color, irrorated with brown; suggestion of brown exterior line in costal region; terminal line thin, almost wanting, dark brown; fringes white. Abdomen fuscous, terminally of cream-colored hairs; ventrally lighter than dorsal surface. Greatest expanse of forewing 14 mm to 16 mm. Genitalia as in figures 44, 78.

Female: As in male except antennae with flagellum basally clothed in cream-colored scales; ventrally with single row of setations; thorax with unicolorous cream-colored collar. Greatest expanse of forewing 15 mm to 17 mm. Genitalia as in figure 119.

Material studied - 133 males, 37 females, April through November. CANADA. *British Columbia:* Duncans, Vancouver Island (USNM). UNITED STATES. *California Counties:* Alpine, Inyo; Lassen; Modoc; Mono; Nevada; San Bernardino; Tulare; Ventura. *Colorado:* Garfield; Routt; *Idaho:* Blaine. *Montana:* Broadwater; Jefferson. *Nevada:* Douglas; Elko. *New Mexico:* McKinley. *Oregon:* Crook; Harney; Klamath; Lake; Multnomah; Umatilla; Wasco. *Utah:* Carbon; Jaub; Salt Lake; Sevier; Tooele. *Washington:* Benton; Walla Walla.

Recognition characters - *A. vittifrons* is a distinct species although it might be confused with *bimarginalis* (Grote), and *totonaca* (Schaus). Both of the last two species possess biserrate, fasciculate antennae in the male, whereas *vittifrons* possesses finely ciliate, apically setose antennae in the male; the costal band in *vittifrons* is cream-color, not light tan or orangish; and the terminal area is brown in *vittifrons*, not bluish or silvery-gray.

This species has a great tendancy to fade with age. Specimens collected only a few decades ago are often brown rather than dark brown. The light costal band of the primaries shows no evidence of fading.

Distribution - *A. vittifrons* has a wide distribution in western North America (see distribution map, fig. 2) and is the most widely distributed

of the *vittifrons* group. It seems to be restricted to a Great Basin flora association. Adults have been collected in August-September on *Chrysothamnes* spp., and in one instance a pair was taken in copula near Burns, Oregon, (28 August 1965) at a nocturnal temperature below 50°F.

Abagrotis totonaca (Schaus)
(figs. 3, 46, 79, 159)

Noctua totonaca Schaus, 1894, Trans. Amer. Entomol. Soc. 21:226, lectotype male "*Noctua totonaca* Schs.", "Jalapa, Mex.", "Collection Wm. Schaus", male genitalia on slide No. 1799 E. L. Todd, Type No. 10823 (USNM), by present designation.

Triphaena totonaca, Hampson, 1903, Cat. Lepidoptera Phalaenidae Brit. Mus. 4:624, 634, pl. 77, fig. 7.

Abagrotis totonaca, Draudt, in Seitz, 1923, the Macrolepidoptera of the World, 7:81, pl. 12(f), fig. 5.

Diagnosis - *Male:* Ground color of primaries dark brown, pale orange costal band prominent. Head with antennae weakly biserrate, fasciculate, with more bristles comprising pectinations of flagellar segments than occur in *bimarginalis;* palpi clothed in brick red hairs, exterolaterally blackish; frons clothed in brick red. Thorax with dorsal and ventral vestiture of brick red; primaries with dark brown ground color, slightly lighter than that found in *bimarginalis;* costal band light tan, irrorated with brick red: basal and transverse anterior lines represented in light costal band as short dark brown transverse dashes; cell black with orbicular spot represented as small brick red dot; reniform mark lighter brown than ground color with black border basally; subterminal line represented as dark brown in terminal portion of costal band; terminal area silverish, fading toward inner margin, thinner than in *bimarginalis;* terminal line black; fringes dark brown, basally with chocolate brown short spatulate scales, terminally with elongated spatulate scales; ventral surface fuscous, lighter and more irrorated with brick red than in *bimarginalis;* secondaries dorsally fuscous, slightly lighter basally than terminally; ventral surface lighter than dorsal surface and irrorated with brick red. Greatest expanse of forewing 17 mm. Genitalia as in figure 46 and 79.

Female: Unknown.

Material studied - MEXICO: Jalapa (holotype male).

Recognition characters - The ordinary crosslines are more contrasting than are those of *bimarginalis*. *A. totonaca* is apparently somewhat smaller than *bimarginalis*. Hampson (1903) was the first worker to place *totonaca* near *bimarginalis*, where it unquestionably belongs. The ground color of the primaries appears lighter in *totonaca* than in *bimarginalis;* in the original description, Schaus wrote the opposite. Whether this is due to fading, or whether Schaus did not have specimens of *bimarginalis*

for comparison and relied solely on Grote's original description is unknown. Draudt (in Seitz, 1923) mentioned *totonaca* to be dark.

Distribution - Thus far known only from the type locality, Jalapa, Mexico.

Abagrotis bimarginalis (Grote)
(figs. 3, 45, 80, 118, 160, 161)

Agrotis bimarginalis Grote, 1883, Ann. Magazine Natur. Hist., 5th series, 11:53, lectotype female, near Hot Springs, Las Vegas, New Mexico, 7,000 ft., August, 1882 (F. H. Snow), genitalia on slide No. 1662 J. G. Franclemont, Type No. 33794 (USNM), from "Col. B. Neumoegen"; 1883, Kansas Acad. Sci. 8:54.

Rhynchagrotis bimarginalis, J. Smith, 1890, Bull. U. S. Nat. Mus. No. 38, pp. 16, 17, 26; 1893, Bull. U. S. Nat. Mus. No. 44, p. 54; Dyar, 1903 (1902), Bull. U. S. Nat. Mus., No. 52, p. 129; J. Smith, 1908, Canad. Ent. 40(7):222, 223; Barnes and McDunnough, 1917, Contrib. Lepidoptera North Amer., p. 48.

Triphaena bimarginalis, Hampson, 1903, Cat. Lepidoptera Phalaenidae Brit. Mus. 4:634.

Lampra bimarginalis, Benjamin, 1921, Bull. So. California Acad. Sci. 20(3):76, 81, pl. 1, fig. 3, pl. 5, fig. 35.

Abagrotis bimarginalis, Draudt, in Seitz, 1923, the Macrolepidoptera of the World, 7:81, pl. 12(f), fig. 3; McDunnough, 1938, Mem. So. California Acad. Sci. 1:67.

Diagnosis - Ground color of primaries dark brown, pale orange costal band prominent. Head with frons clothed in ochre simple and flattened hairs; pedicel of antennae longitudinally bicolor, black and light tan, flagellum biserrate, fasciculate; palpi black exterolaterally, terminal portion of second segment with ochreous annulus; third segment short, stubby, clothed in light tan scales; patch of black simple hairs bordering compound eyes between antennal sockets and commencement of palpi. Thorax with divided collar composed of a mixture of silver-white, garnet brown, and ochreous scales and hairs; dorsally with divided crests of garnet brown hairs; ventrally clothed in light orange hairs; legs predominently clothed in ochreous, tibiae darkest; primaries with basal line absent; costally, a wide pale orange band traversing area from base of wing to subterminal line; transverse anterior area plus basal area, below pale orange costal band, irrorated with orange and rose colored scales; transverse anterior line dark brown, bowing out between main veins; orbicular spot represented by thin longitudinal patch of ochreous scales; reniform mark outlined in pale orange, filled with garnet brown; transverse posterior line smoothly outcurved around reniform mark, yet jagged when crossing each vein; subterminal area very slightly lighter than ground color, subterminal line defined by an abrupt change in ground color to silvery-gray terminal area; terminal line dark brown, continous; fringes

deep fuscous; ventral surface shiny, costally irrorated with orange, remainder of wing fuscous brown; transverse posterior line may be evident, but faintly so; secondaries dorsally fuscous, lighter at base; discal dot hardly discernible; veins outlined in dark brown; fringes lighter than in ground color; ventral surface fuscous; discal line faint; black; costal portion irrorated with rose; discal dot more prominent than on dorsal surface; fringes lighter than in ground color. Abdomen dorsally fuscous, terminally with rose colored scales; laterally with broad black band; ventrally with an admixture of dark brown and rose spatulate scales and hairs, terminally of fawn colored scales. Greatest expanse of forewing 16 mm to 18 mm. Genitalia as in figures 45, 80.

Female: Costal band may be darker orange; transverse posterior line usually better defined. Greatest expanse of forewing 17 mm to 19 mm. Genitalia as in figure 118.

Material studied - 102 males, 12 females, June through September. UNITED STATES. *Arizona:* Cochise; Coconino; Greenlee; Pima; Santa Cruz. *Colorado:* Larimer; Teller. *New Mexico:* Otero; Sandoval; San Miguel; Santa Fe.

Recognition characters - *A. bimarginalis* is most closely related to *totonaca* (Schaus), but can readily be distinguished from the latter by its greater size, lack of transverse markings in the costal band of the primaries, and by its more northern distribution (see distribution map, fig. 3).

Distribution - This southwestern species is rare, probably through lack of collecting in localities where it should be most abundant. A few collectors have been successful in obtaining specimens in July and August at higher elevations (5,000 ft. elevation or higher) in Arizona.